



August 31, 2015

Mr. Stephen Miles, P.E.
ALABAMA SURFACE MINING COMMISSION
P. O. Box 2390
Jasper, AL 35502-2390

RE: Black Warrior Minerals, Inc.
Mine No. 2, P-39--

Dear Mr. Miles:

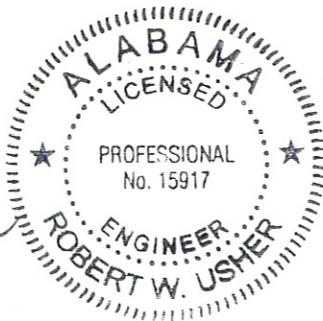
I, Robert W. Usher, a qualified registered professional engineer, hereby certify that the information, cross-sections, data, maps, etc., contained in the design of Primary Road No. 2 are true and accurate to the best of my knowledge and belief. I also certify that this design is in accordance with current, prudent mining engineering practices, and meets or exceeds the applicable parts of 880-X-8F-.17, 880-X-10C-.67, and 880-X-10C-.68 pertaining to the construction, use, and/or maintenance of primary roads.

If you have any questions or need additional information, please do not hesitate to contact our office.

Sincerely,

McGehee Engineering Corp.

A handwritten signature in black ink, appearing to read "Robert W. Usher", is written over the company name.



Robert W. Usher, P.E.
Alabama Reg. No. 15917

BLACK WARRIOR MINERALS, INC.
MINE NO. 2, P-39--

BLACK WARRIOR MINERALS, INC.
MINE NO. 2, P-39—

DETAILED DESIGN FOR PRIMARY ROAD NO. 2

ATTACHMENT III-B-5 (a)

Prepared by:

McGehee Engineering Corp.
P. O. Box 3431
Jasper, Alabama 35502-3431
Telephone: (205) 221-0686
Fax: (205) 221-7721
Email: cw@mcgehee.org

INTRODUCTION

The design for Primary Road No. 2 incorporates the use of a remaining section of the abandoned Jefferson County Road (Sardis Road) that was abandoned during the 1980's by Drummond Company, Inc. at the Morris Mine. See Plan View Map.

Primary Road No. 2 has one existing culvert C-1 located at station 2+44. This structure is a 6X8 foot concrete box culvert with wing walls. It was constructed as part of the original Jefferson County road. The culvert is in good condition and shows no signs of instability.

TRAFFIC CONTROL SIGNS

1. At the entrance of any primary road that accesses a public road, a speed limit sign, SPEED LIMIT 15 MPH, shall be installed.
2. At the exit of any primary road that tees into another road, a stop sign shall be installed to stop traffic before exiting that primary road.

STABILITY ANALYSIS PROCEDURE

The existing fill at Culvert C-1 is shown on the attached Culvert C-1 Profile drawing. The fill was constructed as part of the original Jefferson County road. That road was active for more than 40 years or longer until it was vacated in the 1980's. The fill has shown no signs of instability during the time the road was active or since the vacation. No disturbance outside the existing shoulders is proposed.

DRAINAGE CONTROL STRUCTURES

DRAINAGE DITCHES

Due to the primary road drainage ditches having small drainage areas and an anticipated peak runoff of less than 3.0 C.F.S., one of the three (3) enclosed SEDCAD+ CHANNEL DESIGN TYPICAL ROAD DITCH will be more than adequate to safely pass the anticipated peak runoff from a 10-year, 6-hour precipitation event.

Drainage ditches will be located as dictated by field conditions. There are three options proposed for channel linings of the roadside ditches within these plans. See the three (3) SEDCAD+ CHANNEL DESIGN - TYPICAL ROAD DITCH cross-sections. The following Channels (configuration and lining) may be used in areas where the grades are within the range specified below:

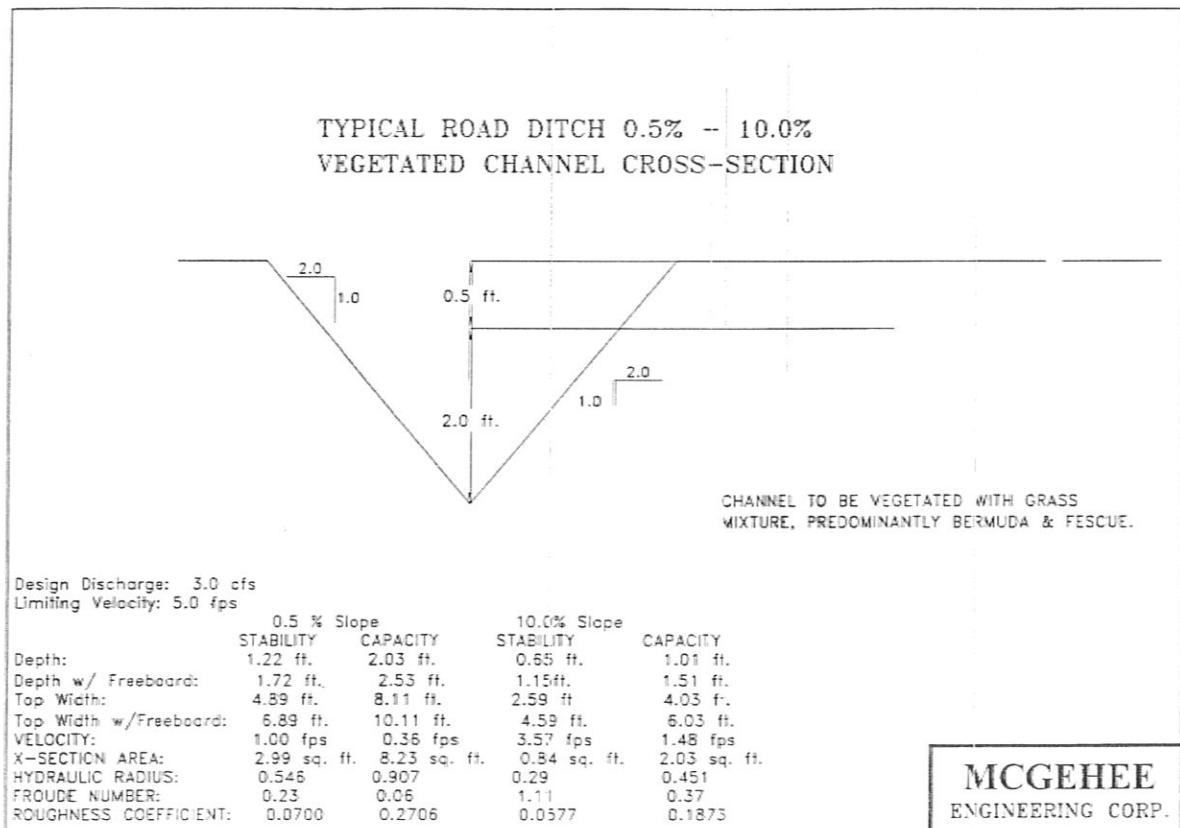
CHANNEL DESCRIPTION	CHANNEL GRADE
Triangular - Grass lined	0.5% - 10.0%

BLACK WARRIOR MINERALS, INC.
MINE NO. 2, P-39--

Triangular - Rip-rap lined	10.0% - 15.0%
Trapezoidal - Grass lined	10.0% - 15.0%

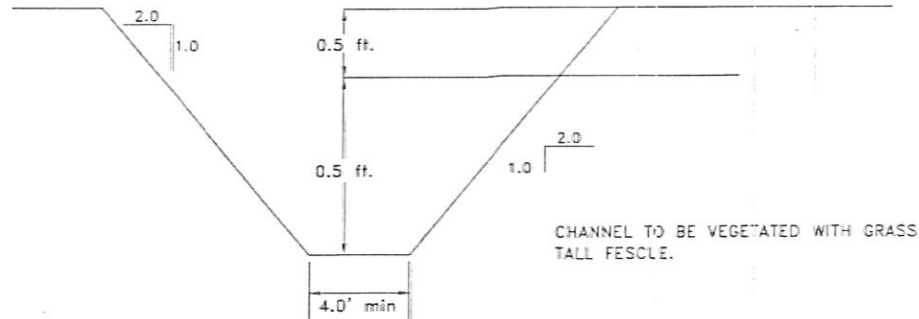
When rip-rap channel lining is necessary, the rip-rap shall be Class II rip-rap.

All rip-rap will be limestone or sandstone material. When a riprap liner is necessary, the entire section of each ditch to be lined with riprap will be underlain with Mirafi 500X or equivalent filter blanket. The location of all drainage ditches with respect to the primary road will be as shown on the enclosed Typical Drainage Ditch X-Section.



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TYPICAL ROAD DITCH 10.0% - 15.0%
VEGETATED CHANNEL CROSS-SECTION

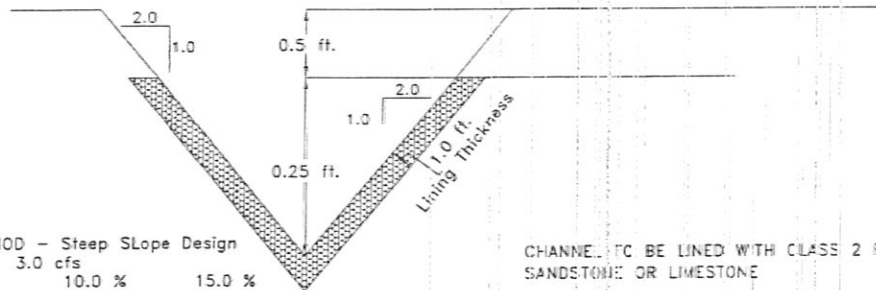


Design Discharge: 3.0 cfs
Limiting Velocity: 5.0 fps

	10.0 % Slope		15.0% Slope	
	STABILITY	CAPACITY	STABILITY	CAPACITY
Depth:	0.26 ft.	0.51 ft.	0.23 ft.	0.45 ft.
Depth w/ Freeboard:	0.76 ft.	1.01 ft.	0.73 ft.	0.95 ft.
Top Width:	5.04 ft.	6.05 ft.	4.92 ft.	5.80 ft.
Top Width w/Freeboard:	7.04 ft.	8.05 ft.	6.92 ft.	7.80 ft.
VELOCITY:	2.54 fps	1.16 fps	2.92 fps	1.36 fps
X-SECTION AREA:	1.18 sq. ft.	2.58 sq. ft.	1.03 sq. ft.	2.21 sq. ft.
HYDRAULIC RADIUS:	0.228	0.410	0.204	0.367
FROUDE NUMBER:	0.93	0.31	1.13	0.39
ROUGHNESS COEFFICIENT:	0.0688	0.2233	0.0683	0.2180

MCGEHEE
ENGINEERING CORP.

TYPICAL ROAD DITCH 10.0% - 15.0%
RIP-RAP CHANNEL CROSS-SECTION



CHANNEL TO BE LINED WITH CLASS 2 RIP-RAP
SANDSTONE OR LIMESTONE

Depth:	0.21 ft.	0.16 ft.
Depth w/ Freeboard:	0.71 ft.	0.66 ft.
Top Width:	0.82 ft.	0.64 ft.
Top Width w/Freeboard:	2.82 ft.	10.11 ft.
VELOCITY:	**	**
X-SECTION AREA:	0.08 sq. ft.	0.05 sq. ft.
HYDRAULIC RADIUS:	0.092	0.072
FROUDE NUMBER:	**	**
MANNING'S N:	**	**
Dmin:	4.00 in.	4.00 in.
D50:	12.00 in.	12.00 in.
Dmax:	15.00 in.	15.00 in.

MCGEE
ENGINEERING CORP.

BLACK WARRIOR MINERALS, INC.
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CULVERTS

The existing drainage culvert, C-1 included in this detailed design was evaluated to insure it is capable to safely carry the peak flow for the following storm: 4.25 inches, 10 year - 6 hour. For the construction information and locations, see the attached Plan View Map and Culvert C-1 Profile.

PRIMARY ROAD NO. 2 - EXISTING DRAINAGE CULVERTS

I.D. NO)	PIPE DIA. (FT)	PIPE LENGTH (FT)	SLOPE % 	DEPTH OF FLOW (FT)	FREEBOARD (FT)
C-1	6X8	98	1.75	1.51	13.3

SEE SEDCAD OUTPUT FOR 10 YEAR-6 HOUR RAINFALL EVENT.

SEE HY-8 CULVERT C-1 OUTPUT

POST MINING LAND USE

All primary roads will be left as permanent roads for landowner access.

Black Warrior Minerals, Inc.

Mine No. 2

Primary Road No. 2

10 Year - 6 Hour Precipitation Event

Robert W. Usher, P.E.

General Information

Storm Information:

Storm Type:	SCS 6 Hour
Design Storm:	10 yr - 6 hr
Rainfall Depth:	4.250 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#4	==>	End	0.000	0.000	

#4
Null

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#4	113.000	113.000	145.89	14.86

Structure Detail:

Structure #4 (Null)

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#4	1	76.000	0.125	0.000	0.000	75.000	S	70.23	7.930
	2	37.000	0.125	0.000	0.000	81.000	F	76.42	6.931
Σ		113.000						145.89	14.862

HY-8 Culvert Analysis Report

Table 1 - Summary of Culvert Flows at Crossing: CULVERT C-1

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
377.47	100.00	100.00	0.00	1
378.52	150.00	150.00	0.00	1
379.46	200.00	200.00	0.00	1
380.33	250.00	250.00	0.00	1
381.15	300.00	300.00	0.00	1
381.94	349.00	349.00	0.00	1
382.77	400.00	400.00	0.00	1
384.13	450.00	450.00	0.00	1
385.60	500.00	500.00	0.00	1
387.12	550.00	550.00	0.00	1
388.32	600.00	571.65	28.26	6
388.00	591.77	591.77	0.00	Overtopping

Rating Curve Plot for Crossing: CULVERT C-1

Total Rating Curve

Crossing: CULVERT C-1

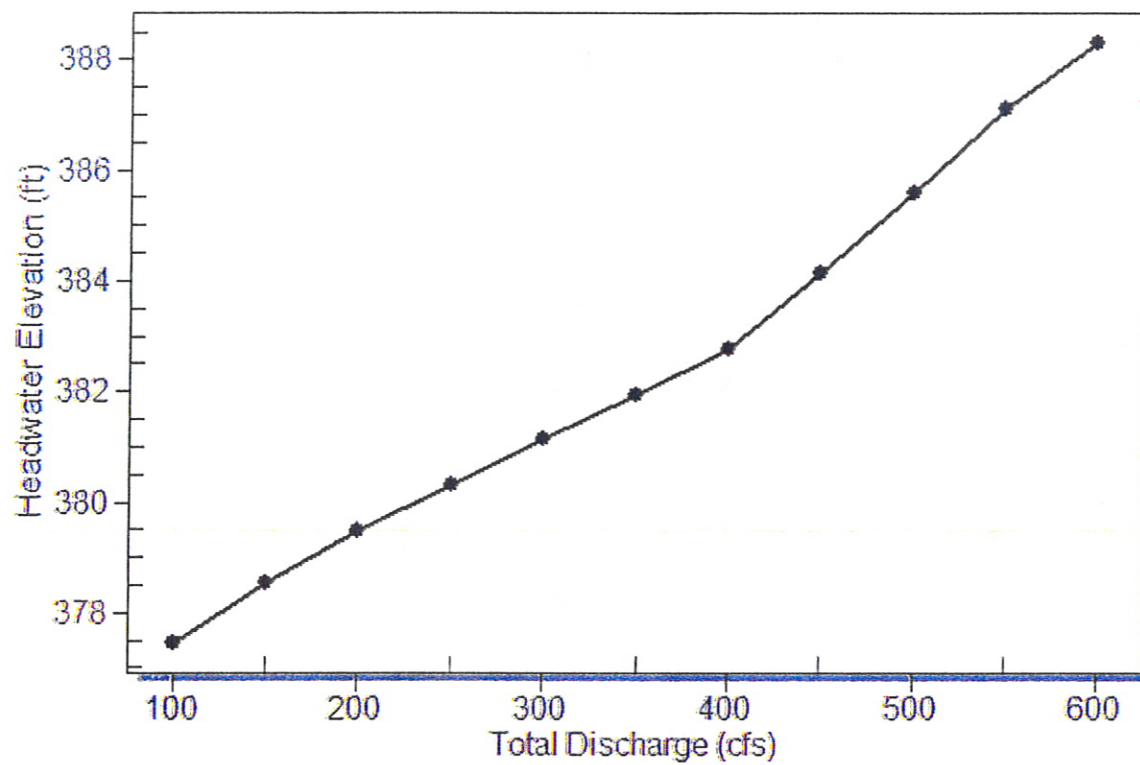


Table 2 - Culvert Summary Table: Culvert 1

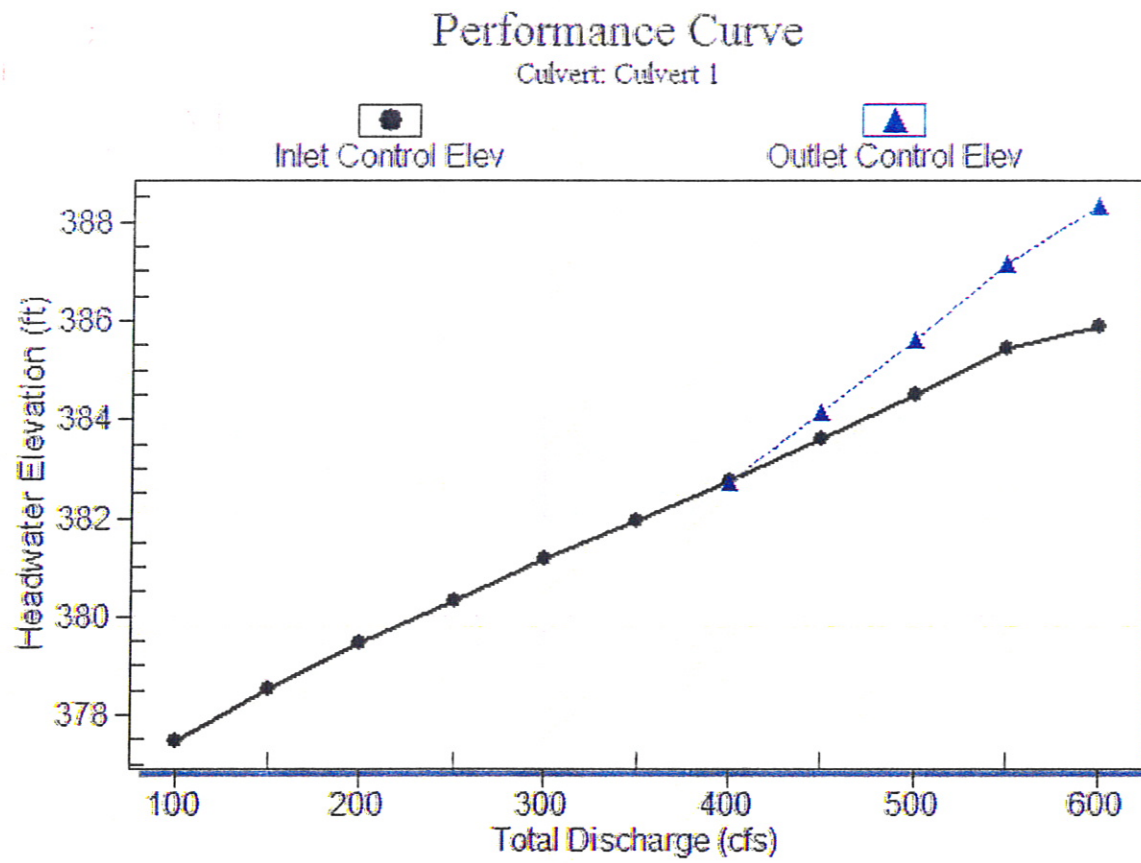
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
100.00	100.00	377.47	3.470	0.0*	1-S2n	1.127	2.055	1.291	2.775	12.907	7.208
150.00	150.00	378.52	4.523	0.0*	1-S2n	1.514	2.693	1.761	3.800	14.195	7.895
200.00	200.00	379.46	5.461	0.0*	1-S2n	1.851	3.263	2.201	4.786	15.147	8.358
250.00	250.00	380.33	6.327	0.0*	1-S2n	2.175	3.786	2.616	5.751	15.928	8.694
300.00	300.00	381.15	7.149	0.0*	1-S2n	2.491	4.275	3.013	6.702	16.594	8.953
349.00	349.00	381.94	7.940	0.0*	1-S2n	2.782	4.729	3.389	7.624	17.164	9.155
400.00	400.00	382.77	8.771	8.711	4-FFf	3.085	5.179	3.085	8.578	21.612	9.326
450.00	450.00	384.13	9.613	10.128	4-FFf	3.373	5.602	8.000	9.508	9.375	9.466
500.00	500.00	385.60	10.499	11.598	4-FFf	3.655	6.010	8.000	10.434	10.417	9.584
550.00	550.00	387.12	11.443	13.122	4-FFf	3.937	6.404	8.000	11.356	11.458	9.686
600.00	571.65	388.32	11.873	14.321	4-FFf	4.058	6.571	8.000	12.277	11.909	9.775

* theoretical depth is impractical. Depth reported is corrected.

Inlet Elevation (invert): 374.00 ft, Outlet Elevation (invert): 372.30 ft

Culvert Length: 98.27 ft, Culvert Slope: 0.0173

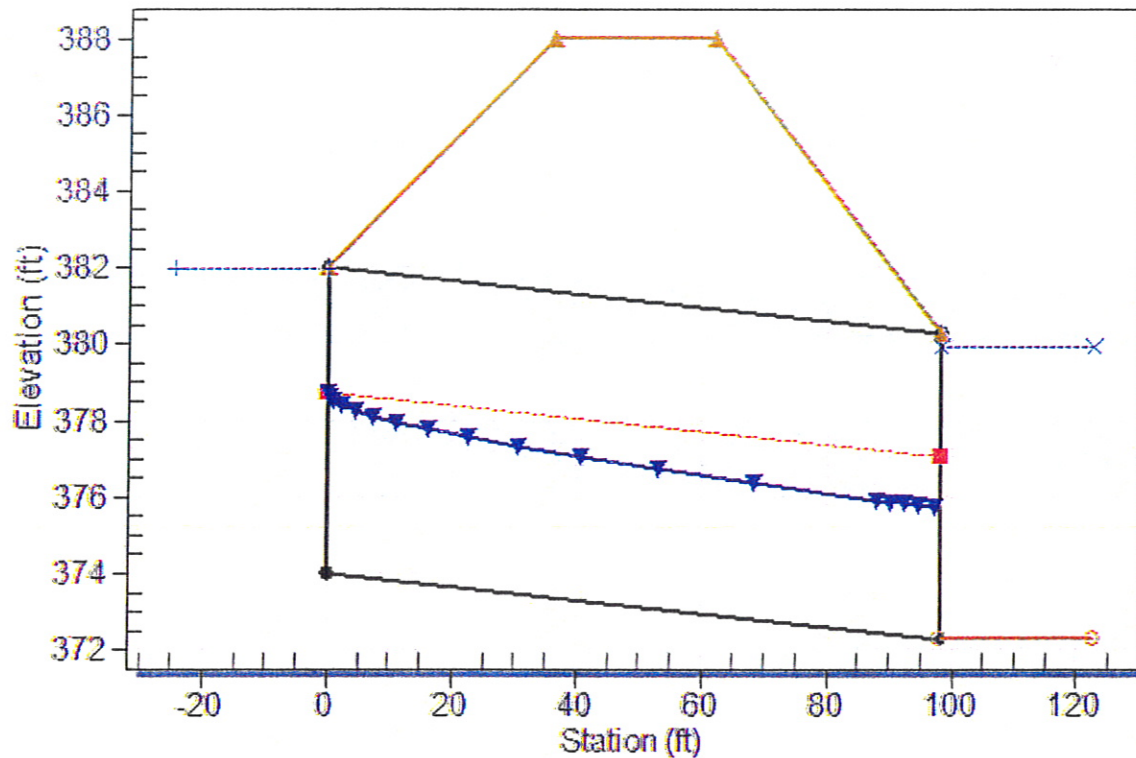
Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1

Crossing - CULVERT C-1, Design Discharge - 349.0 cfs

Culvert - Culvert 1, Culvert Discharge - 349.0 cfs



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 374.00 ft

Outlet Station: 98.26 ft

Outlet Elevation: 372.30 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box

Barrel Span: 6.00 ft

Barrel Rise: 8.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Inlet Type: Conventional

Inlet Edge Condition: Square Edge (90°) Headwall

Inlet Depression: NONE

Table 3 - Downstream Channel Rating Curve (Crossing: CULVERT C-1)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
100.00	375.07	2.77	7.21	3.46	0.76
150.00	376.10	3.80	7.90	4.74	0.71
200.00	377.09	4.79	8.36	5.97	0.67
250.00	378.05	5.75	8.69	7.18	0.64
300.00	379.00	6.70	8.95	8.36	0.61
349.00	379.92	7.62	9.15	9.52	0.58
400.00	380.88	8.58	9.33	10.71	0.56
450.00	381.81	9.51	9.47	11.87	0.54
500.00	382.73	10.43	9.58	13.02	0.52
550.00	383.66	11.36	9.69	14.17	0.51
600.00	384.58	12.28	9.77	15.32	0.49

Tailwater Channel Data - CULVERT C-1

Tailwater Channel Option: Rectangular Channel

Bottom Width: 5.00 ft

Channel Slope: 0.0200

Channel Manning's n: 0.0350

Channel Invert Elevation: 372.30 ft

Roadway Data for Crossing: CULVERT C-1

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 59.30 ft

Crest Elevation: 388.00 ft

Roadway Surface: Gravel

Roadway Top Width: 26.00 ft

INDEX OF DRAWINGS

PRIMARY ROAD NO. 2

WATERSHED MAP
PLAN VIEW MAP

PRIMARY ROAD NO.2 PROFILE VIEW

CULVERT C-1 PROFILE

TYPICAL PRIMARY ROAD DRAWING

**DESIGN, CONSTRUCTION, MAINTENANCE, AND
RECLAMATION SPECIFICATIONS FOR PRIMARY ROADS**

1. LOCATION

- A) Primary roads will be located on ridges or high areas or on the most stable available slopes so as to control and prevent erosion, siltation, flooding, and adverse impacts to fish and wildlife, or their habitat and related environmental values, to the extent possible.
- B) No part of any primary road will be located in the channel of an intermittent or perennial stream without written approval from the Regulatory Authority, in accordance with 880-X-10C-.12 through 880-X-10C-.14 and 880-X-10C-.28.
- C) If at all possible, all primary roads will be located upstream of sediment basins to prevent, control and minimize additional contributions of suspended solids to stream flow or runoff outside the permit area, the violation of applicable State or Federal water quality standards, seriously altering the normal flow of water in stream-beds or drainage channels, and damage to all public or private property.
- D) In instances where it is not possible to locate primary roads in the above manner, sediment control will be achieved by the use of silt fences, rock check dams, hay bale berms, etc.

2. DESIGN REQUIREMENTS

- A) Primary roads will be designed by or under the direct supervision of a qualified registered Professional Engineer experienced in the design and construction of roads, in accordance with the ASMC rules and regulations, and current, prudent engineering practices. No Primary Road grade will be steeper than seventeen (17) percent.
- B) All primary roadway embankments will be designed and constructed to be stable under normal construction and operating conditions, with a minimum static safety factor of 1.3.
- C) All primary roads will be designed, constructed, reconstructed and maintained to have adequate drainage control structures to safely pass the peak runoff anticipated from a 10 year, 6 hour precipitation event.

BLACK WARRIOR MINERALS, INC.
MINE NO. 2, P-39--

3. CONSTRUCTION REQUIREMENTS

- A) The foundation area of the roadbed will be cleared and grubbed of all organic material and the topsoil will be removed. The disturbed area will be kept to the minimum necessary to accommodate the roadbed and/or associated drainage ditch construction.
- B) The road construction material will be suitable subgrade material, free of sod, roots, stumps, etc., and will not contain rocks which exceed twelve (12) inches in diameter. The road construction material will be placed in layers (12 inch maximum thickness) and compacted to ninety five (95%) percent of the standard proctor density, as set forth in ASTM.
- C) The minimum top width of primary roads will under no circumstance be less than eighteen (18) feet and will be of maximum width necessary to facilitate the largest equipment using the road.
- D) All slopes (cut and fill) will be no steeper than 2 horizontal to 1 vertical, unless specified otherwise in the detailed design.
- E) Roadbeds will be cut into consolidated, non-erodible material or will be surfaced with durable, non-toxic, non-acid forming material. In most instances, durable sandstone overburden material from the mine site will be used for surfacing material. In instances where durable sandstone overburden material from the site is not available or suitable, then durable, non-toxic, non-acid forming material, such as chert, crushed limestone, redrock, and/or crushed sandstone will be hauled in from off site, placed and compacted on the roadbed surface a minimum depth of four (4) inches.
- F) Primary roads will be constructed with grades as shown on the Detailed Primary Road Design Plans. No Primary Road grade will be steeper than seventeen (17) percent.

4. DRAINAGE AND SEDIMENT CONTROL REQUIREMENTS

- A) Primary roads will be constructed, reconstructed, and maintained to have adequate drainage control, using structures such as, but not limited to bridges, culverts, drainage pipes, ditches, cross drains, and ditch relief drains designed to safely pass the peak runoff anticipated from a 10 year, 6 hour precipitation event. All drainage control structures will be designed and constructed in such a manner whereas, to allow a free and operating conditions to prevent, control, and minimize erosion at the inlets and outlets.

BLACK WARRIOR MINERALS, INC.
MINE NO. 2, P-39--

- B) Culverts and drainage pipes will be designed and installed to provide adequate support for the load of the largest equipment using the road. For design purposes, "H-20" (live load + impact) was used. All culverts or drainage pipes with diameters of forty-eight (48) inches or less will be covered with a minimum of one (1) foot and the maximum cover will not exceed fifty-seven (57) feet of desirable compacted material. All culverts or drainage pipes with diameters greater than forty-eight (48) inches will be covered with a minimum of two (2) feet and the maximum cover will not exceed forty-one (41) feet of desirable compacted material. See Detailed Primary Road Design Plans for actual depth of material proposed above each culvert or drainage pipe.
- C) Culverts and drainage pipes will be designed and installed to allow adequate freeboard to prevent overtopping of the embankment.
- D) Drainage ditches, cross drains, and ditch relief drains will be constructed and maintained to prevent uncontrolled surface drainage over the road surface and roadway embankment.
- E) Drainage ditches will be constructed with no sustained grades greater than five (5%) percent, unless unavoidable. If ditches must be constructed with grades in excess of five (5%) percent, drainage ditches will be lined as shown on the Primary Road Detailed Design Plans.
- F) Sediment control will be achieved by the use of silt fences, rock check dams, hay bale berms, etc. in strategic locations, to prevent excessive siltation to the receiving streams.
- G) Upon completion of construction of all roads, the side slopes of the roadway cut and fill sections, including all borrow areas formed in the construction, areas used for disposal of excess material, ditches, etc. will be seeded with a mixture of perennial and annual grasses, fertilized and mulched to prevent erosion and ensure restabilization. Grass mixtures will include, but not be limited to, fescue, bermuda, rye grass, browntop millet, clover and sericea.

5. INSPECTION AND MAINTENANCE REQUIREMENTS

- A) Routine inspections and maintenance (such as regrading, resurfacing, maintenance of sediment control structures, spot replanting, and dust control) will be conducted regularly during the life of each road to assure that each road continually meets design and performance standards.
- B) Dust control will be achieved by the periodic application of water, chemical binders and/or other dust suppressants.

BLACK WARRIOR MINERALS, INC.
MINE NO. 2, P-39--

- C) Any road damaged by a catastrophic event, such as a flood, or earthquake, will be repaired as soon as it is practicable after the damage has occurred.

6. CERTIFICATION REQUIREMENTS

- A) Primary roads will be designed by or under the direct supervision of a qualified registered Professional Engineer experienced in the design and construction of roads, in accordance with the ASMC rules and regulations, and current, prudent engineering practices. Each design will be certified by a registered Professional Engineer as being designed in accordance with the Regulations of the Alabama Surface Mining Commission, Chapter 880-X-10.
- B) Upon the completion of the construction of each section of the primary road, as set forth in the detailed design plans, the construction will be certified by a registered Professional Engineer, to the Alabama Surface Mining Commission, as being constructed in accordance with the approved detailed design plans.
- C) In the event that a primary road is mined through in the mining process and must be reconstructed, the newly constructed primary road will be reconstructed to the minimum design criteria within the detailed design plans and the construction will be certified by a registered Professional Engineer, to the Alabama Surface Mining Commission, as being constructed in accordance with the approved detailed design plans.

7. REMOVAL AND RECLAMATION REQUIREMENTS

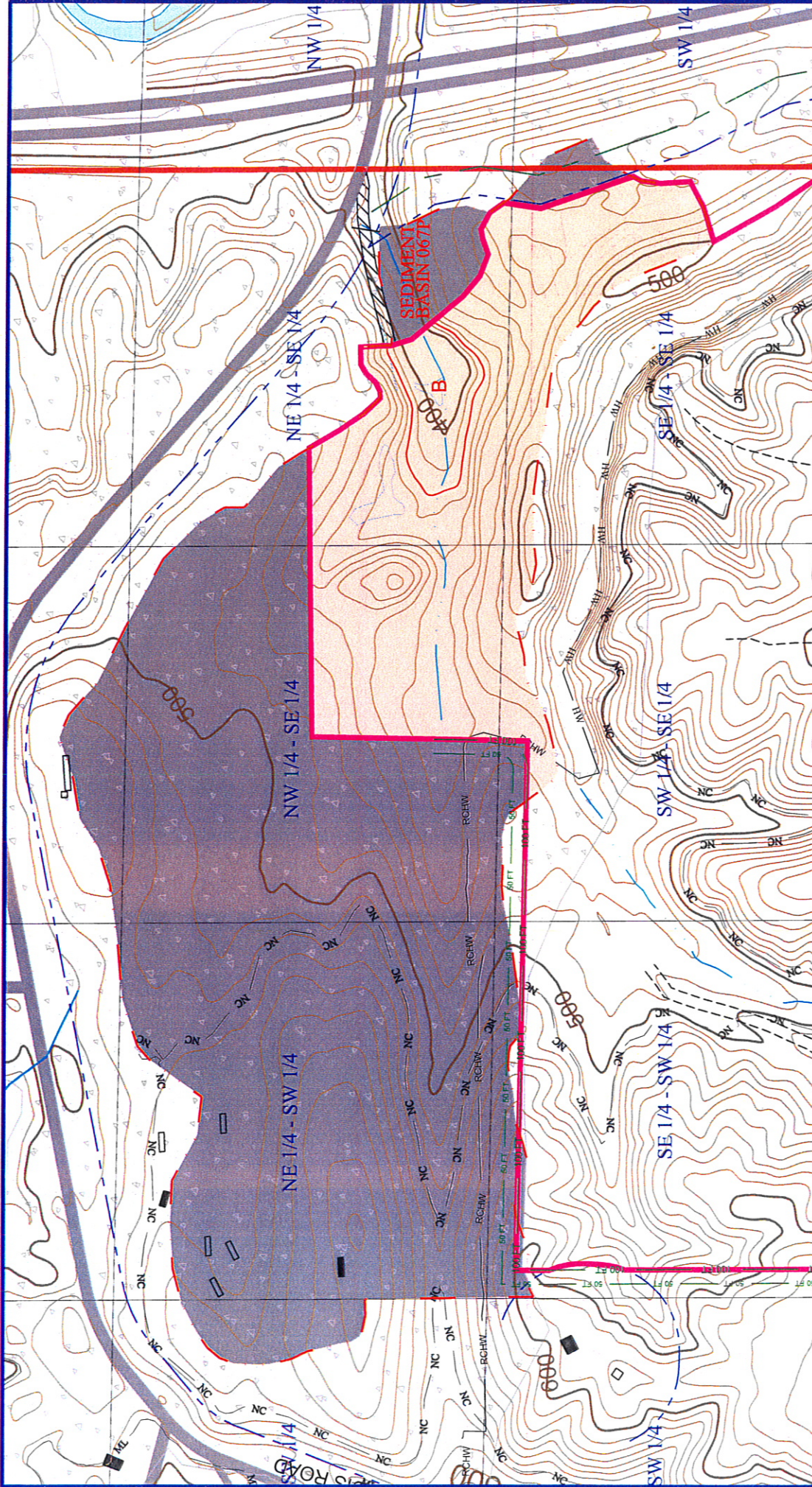
- A) All primary roads which are not mined through and remain after the completion of mining may be left as permanent roads for landowner access, if there is no opposition by said landowner.
- B) All primary roads which are not mined through and remain after the completion of mining which are not to be retained as permanent for landowner access will be removed and reclaimed in accordance with the approved grading and reclamation plans as soon as practicable after it is no longer needed for mining and reclamation purposes. This removal and reclamation will include:
 - 1. Closing the road to traffic;
 - 2. Removing all bridges, culverts, drainage pipes, and other drainage control structures, unless otherwise approved as part of the post mining land use;

BLACK WARRIOR MINERALS, INC.
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3. Removing and/or otherwise disposing of road surfacing materials, that are not compatible with the post mining land use and revegetation requirements, onsite or removed and stored for re-use;
4. Reshaping and regrading cut and fill slopes as necessary to be compatible with the post mining land use and to compliment the natural drainage pattern of the surrounding terrain;
5. Protecting the natural drainage patterns by installing dikes or cross drains as necessary to control surface runoff and erosion;
6. Scarifying or ripping the roadbed, replacing topsoil or substitute material, and revegetating the entire disturbed area in accordance with the approved reclamation plan.

8. TYPICAL ROADBED CONFIGURATION

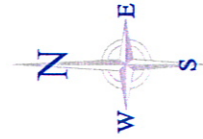
- A) See attached **typical primary road drawing**, cross-sections, etc., for an illustration of the typical roadbed configurations.

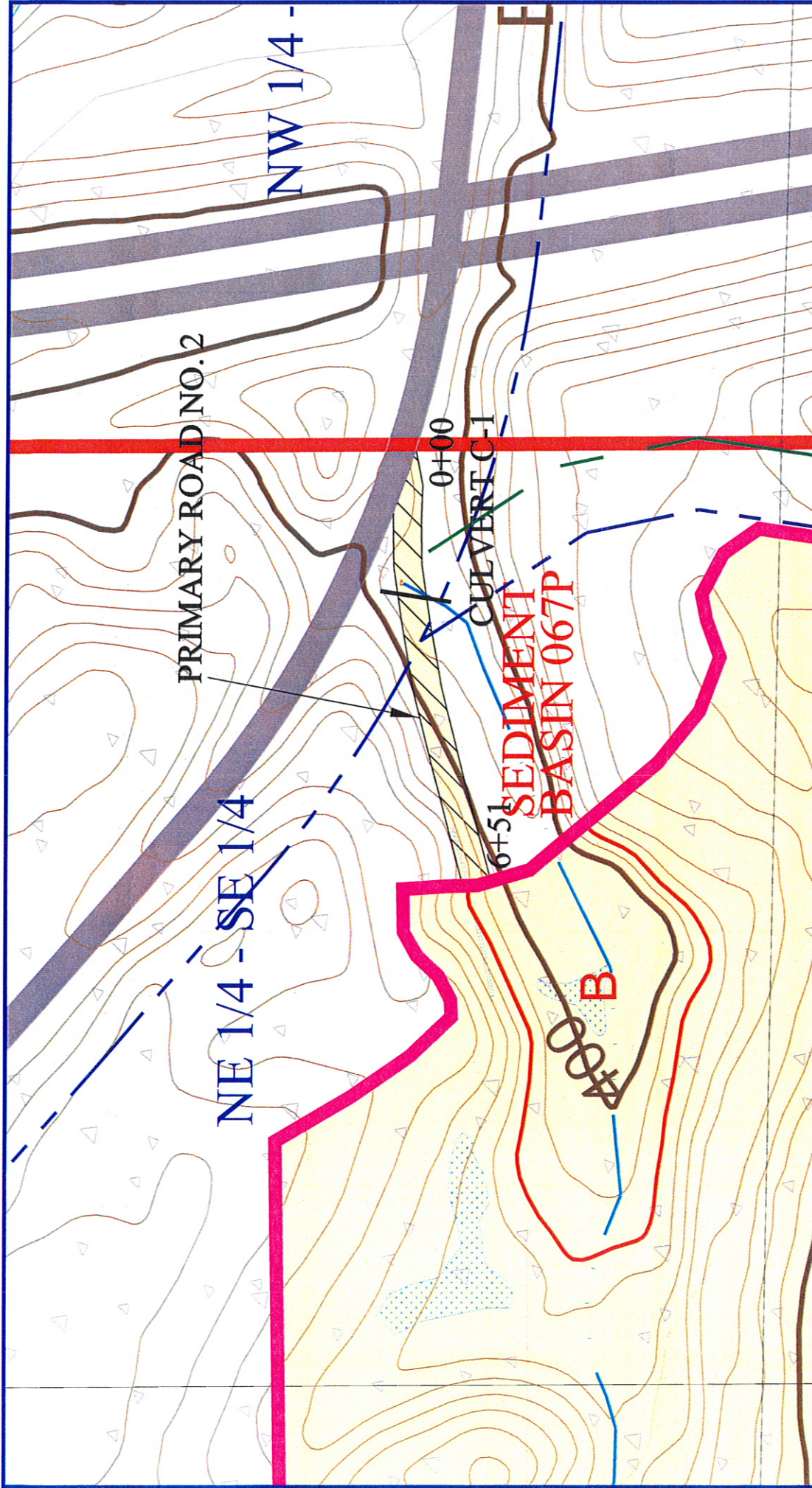


BLACK WARRIOR MINERALS, INC.

MINE NO. 2, P-39
 PRIMARY ROAD NO. 2
 WATERSHED MAP
 SCALE 1" = 500'

- PERMIT BOUNDARY
- DRAINAGE DIVIDE
- PREVIOUSLY MINED AREA, CN 75
- GRADED AND BARE, CN 81





BLACK WARRIOR MINERALS, INC.

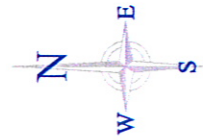
MINE NO. 2, P-39

PRIMARY ROAD NO. 2

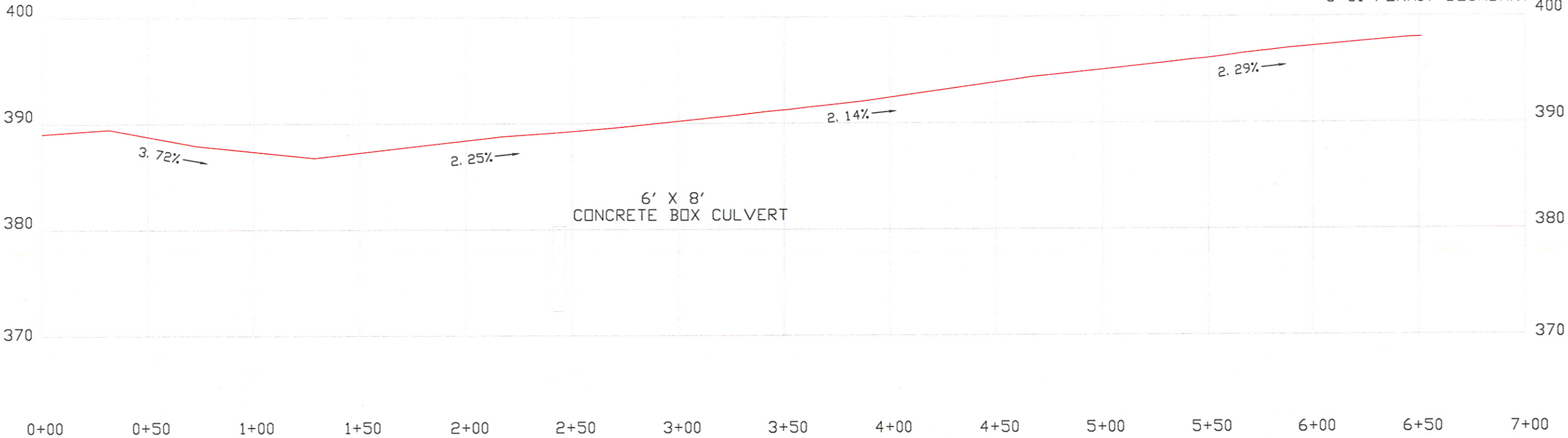
PLAN VIEW MAP

SCALE 1" = 200'

PERMIT BOUNDARY



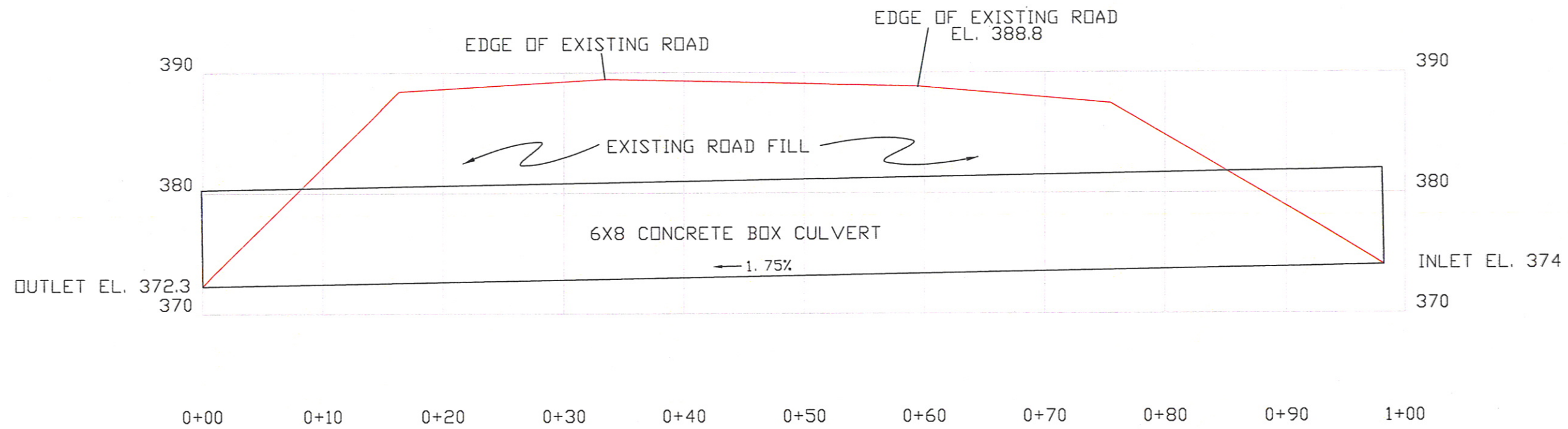
EDGE OF SARDIS ROAD



BLACK WARRIOR MINERALS, INC.

MINE NO. 2, P-39
PRIMARY ROAD NO. 2
PROFILE VIEW
SCALE 1" = 50' H
1" = 10' V

EXISTING AND FINAL ROAD GRADE

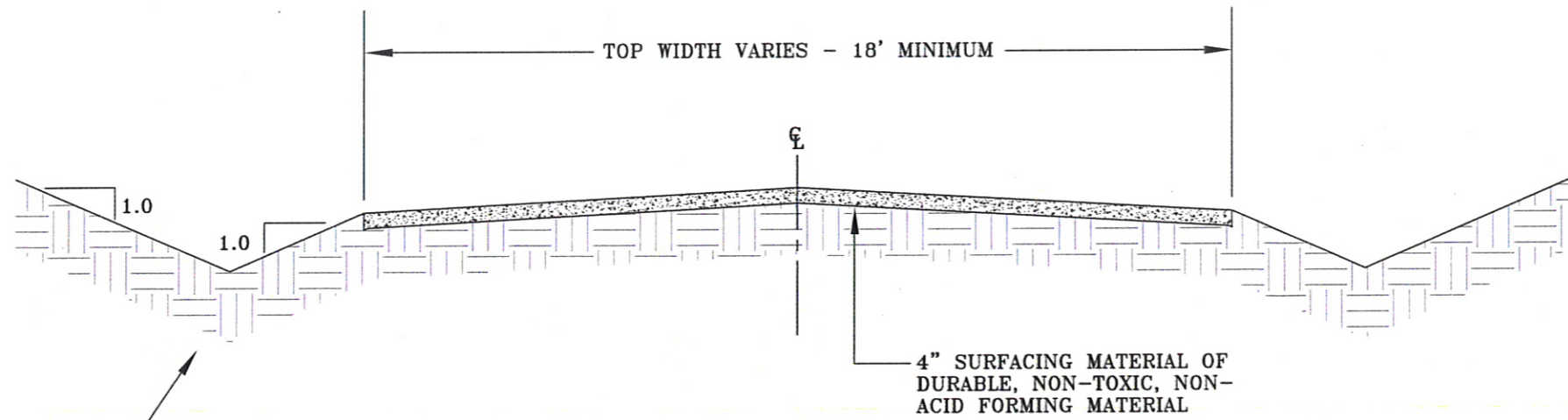


BLACK WARRIOR MINERALS, INC.

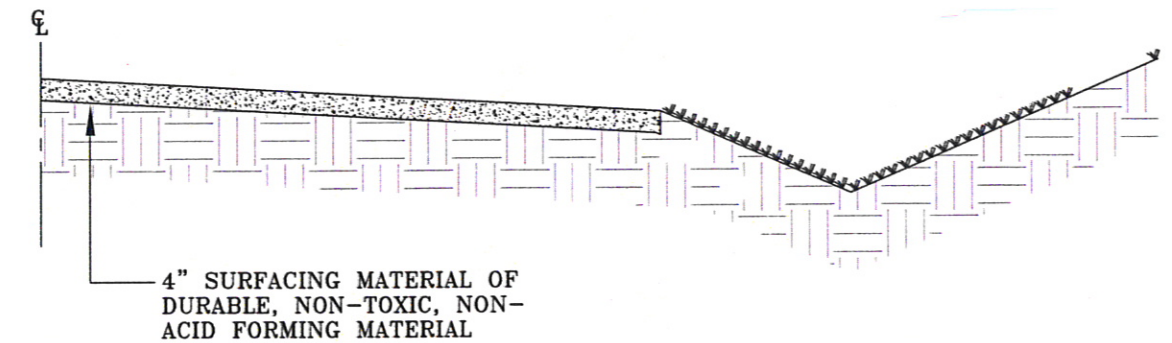
MINE NO. 2, P-39
PRIMARY ROAD NO. 2
CULVERT PROFILE VIEW
SCALE 1" = 10' H & V

EXISTING AND FINAL ROAD GRADE

**PRIMARY ROAD
TYPICAL CUT SECTION
NO CUT SECTIONS PROPOSED**

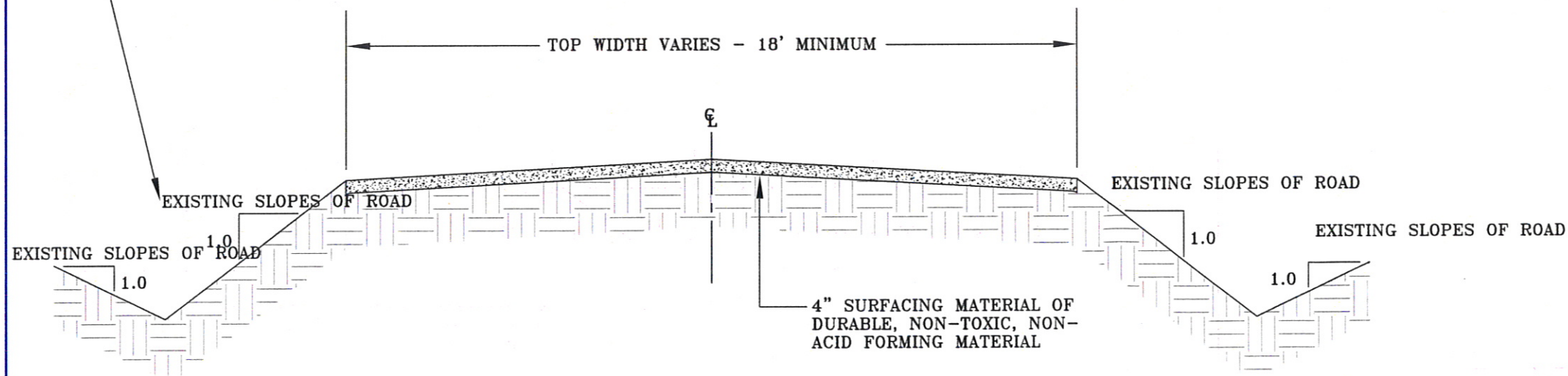


**PRIMARY ROAD
TYPICAL DRAINAGE DITCH CROSS-SECTION
NO DITCHES PROPOSED**



NO DRAINAGE DITCHES PROPOSED
DRAINAGE DITCH TO BE LINED WITH GRASS MIXTURE.
SEE SPECIFICATIONS. SEE DETAILED DESIGN PLANS FOR
SPECIFIC DESIGN REQUIREMENTS.

**PRIMARY ROAD
TYPICAL FILL SECTION
VACATED JEFFERSON COUNTY ROAD**



PRIMARY ROAD NO. 2 PROPOSES TO USE A PORTION OF THE JEFFERSON COUNTY SARDIS ROAD(VACATED
IN THE 1980'S) THAT IS IN PLACE.